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UNITED STATES PATENT AND TRADEMARK OFFICE

Examiner:

Group:

Attorney Docket # 1879

Applicant(s) : MUELLER, M., ET AL

Serial No. :

Filed :

For : ACTUATOR AND METHOD FOR MOUNTING AN
ACTUATOR

SIMULTANEOUS AMENDMENT

November 1, 2001

Honorable Commissioner of Patents and Trademarks
Washington, D.C. 20231

S I R S:

Simultaneously with filing of the above identified application
please amend the same as follows:

In the Claims:

Cancel all claims without prejudice.

Substitute the claims attached hereto.

REMARKS:

This Amendment is submitted simultaneously with filing of the above identified
application.


With the present Amendment applicant has amended the claims so as to eliminate
their multiple dependency.

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Consideration and allowance of the present application is most respectfully requested.

Respectfully submitted,



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Claims

1. An actuator (1), in particular for an assembly of a
5 motor vehicle,

having a unit comprising an electric motor (3), a gear
(47), and a motor electronics unit (4),

10 having a housing (9), which comprises a gear housing (12)
for the gear (47) and an electronics housing (15) for the motor
electronics unit (4),

15 having a motor housing (6) of the electric motor (3), which
housing is connected to the housing (9),

having a shaft (19) of the electric motor (3), which shaft
protrudes into the gear housing (12),

20 having a brush holder (41) in the housing (9),

having a printed circuit board (31),

• which is disposed in the electronics housing (15),

25 • which is connected to an external connection plug (37),

• which is electrically connected to the brush holder (41)
and to components of the motor electronics unit (4),

30 characterized in that

the brush holder (41), for installation in the actuator (1), is loosely coupled to the printed circuit board (31).

2. The actuator of claim 1,

characterized in that

the brush holder (41), after installation in the actuator (1), is secured to the housing (9).

3. The actuator of claim 1 [or 2],

characterized in that

the brush holder (41) is disposed in the region of the electronics housing (15).

4. The actuator of [one or more of claims 1-3] claim 1,

characterized in that

the brush holder (41) is loosely coupled to the printed circuit board (31) by detent elements (43).

5. The actuator of [one or more of claims 1-4] claim 1,

characterized in that

electrical components (54) are disposed movably on the brush holder (41) in a receptacle (72), so that their electrical connection lines (51) can be connected electrically to the printed circuit board (31) without mechanical stresses, when the

brush holder (41) is mounted in the housing (9).

6. The actuator of claim 1,

5 characterized in that

the gear housing (12) and electronics housing (15) comprise
at least one upper part (23, 26) and at least one lower part (24,
27), and

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that at least one lower part (24) of the gear housing (12)
and at least one lower part (27) of the electronics housing (15)
are integral.

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7. The actuator of claim 1 [or 6],

characterized in that

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at least one upper part (26) of the electronics housing
(15) is integral with at least one upper part (23) of the gear
housing (12).

8. The actuator of claim 1,

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characterized in that

the motor housing (6) and at least one part of the housing
(9) are integral.

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9. The actuator of claim 1,

characterized in that

the printed circuit board (31) is fixed to the housing (9) by means of elastic contact-pressure elements (37), which are disposed on the lower part of the housing (24, 27).

5 10. A method for mounting an actuator (1), comprising an electric motor (3) with a motor housing (6) and having a rotor, which has a shaft (19) with a commutator (58), and having a printed circuit board (31), a housing (9), bearings, a brush holder (41) and electrical components (54), in particular of [one
10 or more of claims 1-9] claim 1, having the following method steps:

- the motor housing (6) of the electric motor (3) is connected to the housing (9), so that part of the shaft (19) with
15 the commutator (58) protrudes into the housing (9);

- the brush holder (41) is mounted to the printed circuit board (31) having the motor electronics unit (4) and the connection plug (37) by the provision that the detent hooks (43)
20 of the brush holder (41) snap into place on the printed circuit board (31);

- the printed circuit board (31) is introduced into the housing (9);
25

- the printed circuit board (31) is guided in the housing (9) by means of at least one guide peg (72);

- the brush holder (41) is guided in the housing (9) by means of at least one guide protrusion (74);
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- brushes of the brush holder (41) grip the commutator (58)

- the brush holder (41) is fixed to the housing (9);

- the at least one upper part of the electronics housing (26) and the at least one lower part of the housing (24, 27) are mounted.

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11. The method of claim 10,

characterized in that

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after the installation of the printed circuit board (31) in the actuator (1), the detent hooks (43) of the brush holder (41) are released from the printed circuit board (31).

Claims

1. An actuator (1), in particular for an assembly of a
5 motor vehicle,

having a unit comprising an electric motor (3), a gear
(47), and a motor electronics unit (4),

10 having a housing (9), which comprises a gear housing (12)
for the gear (47) and an electronics housing (15) for the motor
electronics unit (4),

15 having a motor housing (6) of the electric motor (3), which
housing is connected to the housing (9),

having a shaft (19) of the electric motor (3), which shaft
protrudes into the gear housing (12),

20 having a brush holder (41) in the housing (9),

having a printed circuit board (31),

• which is disposed in the electronics housing (15),

25 • which is connected to an external connection plug (37),

• which is electrically connected to the brush holder (41)
and to components of the motor electronics unit (4),

30 characterized in that

the brush holder (41), for installation in the actuator (1), is loosely coupled to the printed circuit board (31).

2. The actuator of claim 1,

characterized in that

the brush holder (41), after installation in the actuator (1), is secured to the housing (9).

3. The actuator of claim 1,

characterized in that

the brush holder (41) is disposed in the region of the electronics housing (15).

4. The actuator of claim 1,

characterized in that

the brush holder (41) is loosely coupled to the printed circuit board (31) by detent elements (43).

5. The actuator of claim 1,

characterized in that

electrical components (54) are disposed movably on the brush holder (41) in a receptacle (72), so that their electrical connection lines (51) can be connected electrically to the printed circuit board (31) without mechanical stresses, when the

brush holder (41) is mounted in the housing (9).

6. The actuator of claim 1,

5 characterized in that

the gear housing (12) and electronics housing (15) comprise
at least one upper part (23, 26) and at least one lower part (24,
27), and

10

that at least one lower part (24) of the gear housing (12)
and at least one lower part (27) of the electronics housing (15)
are integral.

15 7. The actuator of claim 1,

characterized in that

at least one upper part (26) of the electronics housing
20 (15) is integral with at least one upper part (23) of the gear
housing (12).

8. The actuator of claim 1,

25 characterized in that

the motor housing (6) and at least one part of the housing
(9) are integral.

30 9. The actuator of claim 1,

characterized in that

the printed circuit board (31) is fixed to the housing (9) by means of elastic contact-pressure elements (37), which are disposed on the lower part of the housing (24, 27).

5 10. A method for mounting an actuator (1), comprising an electric motor (3) with a motor housing (6) and having a rotor, which has a shaft (19) with a commutator (58), and having a printed circuit board (31), a housing (9), bearings, a brush holder (41) and electrical components (54), in particular of
10 claim 1, having the following method steps:

- the motor housing (6) of the electric motor (3) is connected to the housing (9), so that part of the shaft (19) with the commutator (58) protrudes into the housing (9);

15 • the brush holder (41) is mounted to the printed circuit board (31) having the motor electronics unit (4) and the connection plug (37) by the provision that the detent hooks (43) of the brush holder (41) snap into place on the printed circuit
20 board (31);

- the printed circuit board (31) is introduced into the housing (9);

25 • the printed circuit board (31) is guided in the housing (9) by means of at least one guide peg (72);

- the brush holder (41) is guided in the housing (9) by means of at least one guide protrusion (74);

30 • brushes of the brush holder (41) grip the commutator (58) and align the brush holder (41) with the commutator (58);

- the brush holder (41) is fixed to the housing (9);

- the at least one upper part of the electronics housing (26) and the at least one lower part of the housing (24, 27) are mounted.

5

11. The method of claim 10,

characterized in that

10

after the installation of the printed circuit board (31) in the actuator (1), the detent hooks (43) of the brush holder (41) are released from the printed circuit board (31).